

Remarks

The Applicants thank the Examiner for the courtesy shown during the telephone interview on October 25, 2004. Although no agreement was ultimately reached, several claim amendments have been made in accordance with the Examiner's helpful suggestions provided during the interview.

The rejection of Claim 11 based on 35 U.S.C. §112 is acknowledged. Claim 11 has been cancelled, thereby rendering the rejection moot.

The rejection of Claims 1, 3, 5, 6 and 11-15 as allegedly obvious over King is acknowledged. As pointed out in response to the previous Official Action ("the May 21 Response"), Claim 1 is directed to a two-step process in which a crude starting material is ultimately converted into useful C7 or C8 aromatic hydrocarbons. The first step is distilling the crude starting material to obtain a material having a very low and well defined non-aromatic compound content. The material having a low non-aromatic compound content is reacted in the second step to obtain the useful C7 or C8 aromatic hydrocarbons. It is the combination of these two steps that provide the unexpected results discussed in the May 21 Response; and each must be performed in order to achieve the unexpected results found by the Applicants.

The distillation process of the first step provides the starting material for the second step, which must have a very low non-aromatic compound content. Performance of this first step is based on the critical discovery that the reaction of a material having a very low non-aromatic compound content, in the presence of hydrogen and a catalyst containing mordenite and about 0.02 to 2% by weight rhenium (to diminish the benzene content and convert at least a portion of the material into useful C7 or C8 aromatic hydrocarbons), requires a surprising low amount of hydrogen and results in a surprising long catalytic life. In fact, the two-step process utilizes over 25% less hydrogen and essentially doubles the life of the catalyst when compared to known processes.

The unexpected results achieved by the Applicants are only obtainable when the materials used in the second step reaction have a very low non-aromatic compound content. Thus, the second step must be coupled with the first step to achieve the results, as affirmatively recited in Claim 1.

To further emphasize the importance of the two-step process, Claim 1 has been amended to recite that the crude starting material includes at least about 10% by weight non-aromatic compounds. Support for the amendment can be found, for example, in Table 1 on page 17. The initial non-aromatic compound content is lowered by the distillation of the first step to produce a material having the very low non-aromatic compound required for the second step reaction.

Claim 1 has also been amended in light of the Examiner's helpful suggestions provided during the telephone interview of October 25, 2004. Specifically, the claim has been amended to recite that the catalyst includes an H-type synthetic mordenite. In addition, the pressure and temperature conditions that are suitable for carrying out the second step reaction are now recited in the claim as suggested by the Examiner. Support for the H-type synthetic mordenite recitation can be found, for example, on page 16, line 6. Support for the reaction temperature range can be found, for example, on page 9, line 7. Support for the range of pressures recited in Claim 1 can be found on page 9, line 2.

King provides no description or suggestion to obtain useful C7 and C8 aromatic hydrocarbons from a crude starting material having a non-aromatic compound content of at least about 10% as is now recited in Claim 1. In sharp contrast, King contemplates the use of an aromatic hydrocarbon starting material that can be "any mixed aromatic feed stock conventionally available in a refinery or chemical plant that is predominately made up of monocyclic C6 or C12 aromatic hydrocarbons". See column 7, lines 59-64. King does not describe the use of a crude starting material having a non-aromatic compound content of at least about 10%. Moreover, based on a fair

reading of King, it would be evident to one skilled in the art that the non-aromatic content of the starting material is not considered to be critical. In fact, the non-aromatic content is not even considered. Thus, King provides no suggestion to start with a material having more than about 10% by weight non-aromatic compounds. Because there is no description or suggestion to use a crude material having more than about 10% by weight non-aromatic compounds, there is also no suggestion to combine the process shown in King with a preliminary first step in which the material having the important low non-aromatic content is prepared.

New independent Claims 18 and 24 have been added to the application to further emphasize the importance of the low non-aromatic content of the starting material for the second step reaction. New Claim 18 recites that the non-aromatic compound content of the material is 0.5% by weight or less, while new Claim 24 recites that this content is 0.1% by weight or less. Support for the new claims can be found in the written description on page 11, in the last sentence of the first (partial) paragraph. Further support for the more preferred content of 0.1% or less by weight of non-aromatic compounds can be found in example 1, table 1, on page 17.

It is respectfully submitted that, in addition to the reasons set forth above, King does not render obvious the preferred and more preferred embodiments recited in the new independent claims because King fails to describe or suggest the non-aromatic compound contents recited in the new independent claims. As previously noted, King fails to provide a suggestion to provide a starting material with any particular non-aromatic content because King simply does not appreciate the importance of the low non-aromatic compound content. With respect to the 0.74 mole percent of non-aromatic compound disclosed in King, one cannot determine whether this amount is less than 1% by weight because the molecular weight of the non-aromatic is unknown. Therefore, King cannot be considered to inherently disclose the claimed 1% by weight or less of non-aromatic

compound content in the starting material for the second step reaction. With respect to the new independent claims, King can certainly not be said to describe or suggest the use of a starting material having a non-aromatic compound content of 0.5 weight percent, and especially not less than 0.1 weight percent or less. Thus, the claims are patentable over King.

In response to the Examiner's observations concerning the example set forth in the application (page 5, last paragraph of the Official Action), the Applicants respectfully submit that the scope of the claims need not be limited to the example provided in the specification. However, the non-aromatic compound content of 0.1% by weight or less for the second step reaction recited in new claim 24 is the same as that shown in example 1 in the specification. Thus, the Applicants have actually proven that the upper limit of this specific non-aromatic content range is effective to achieve the unexpected results firmly established in the May 21 Response. For this reason also, it is respectfully submitted that claim 24 and its dependent claims are patentable over King.

For the reasons set forth above, it is respectfully requested that the rejections based on 35 U.S.C. §103 over King, either alone or in combination with the alleged admissions set forth in the specification, be reconsidered and withdrawn. It is believed that the application is now in condition for allowance, which action is respectfully solicited.

Respectfully submitted,



T. Daniel Christenbury
Reg. No. 31,750
Attorney for Applicants

TDC:SAN:vbm
(215) 656-3381